I Claim

1. An apparatus for supporting a conveyer type submerged roller comprising:

   a substantially hollow cylindrical roller submerged in a fluid;
   a stationary shaft, having two ends, extending along the longitudinal axis of the roller and fixed or supported at each end;
   a plurality of bearing housings with sleeves or inserts, fixed to the roller such that the bearing housings rotate with the roller;
   the roller bearing housings secure sleeve or insert bearing surfaces to contact mating bearing surfaces on the stationary shaft;
   the stationary shaft has increased lateral moment of inertia adjacent to at least one bearing housing.

2. The apparatus of claim 1 wherein each roller bearing housing comprises at least a bearing material sleeve.

3. The apparatus of claim 1 wherein each roller bearing housing comprises at least a bearing material insert.

4. The apparatus of claim 1 wherein there are radial and axial bearing surfaces, one to withstand radial roller loads and the other to withstand axial thrust roller loads with respect to the stationary shaft.

5. The apparatus of claim 1 wherein the bearing housings are fixed to the roller by at least one keyway to transmit torque from the bearing housing to the roller.

6. The apparatus of claim 1 wherein the bearing housings is secured to the roller by at least one short anchor bolt or at least one tie rod axially positioned within the substantially hollow cylindrical roller.

7. The apparatus of claim 1 further comprising end plates on either side of the bearing housings to secure the roller bearing sleeves or inserts.

8. The apparatus of claim 1 wherein the bearing housings are secured to the roller by vane like ribs to motivate the flow of fluid radially outward as the roller rotates.

9. The apparatus of claim 1 wherein the roller bearing surfaces are ported to admit the liquid as a coolant or bearing lubricant.

10. The apparatus of claim 1 wherein at least one tie rod is enclosed within at least one cylindrical shell section interleaved between the bearing housings within the roller.

11. The apparatus of claim 1 wherein the buoyancy of the submerged roller is increased by including at least one cylindrical tube within the contained volume of the roller with mass density less than that of the surrounding fluid.

12. The apparatus of claim 1 wherein the stationary shaft includes coolant passages.

13. The apparatus of claim 1 wherein the roller is operating submerged in a molten zinc-pot of a steel galvanizing line.

14. A method for supporting a conveyer type submerged roller comprising: securing a substantially hollow cylindrical roller submerged within a liquid on a stationary shaft extending axially and concentrically through the roller;
mounting means for roller bearing housings to the interior of the roller to mate with bearing surfaces on the stationary shaft;
varying the lateral moment of inertia of the stationary shaft interleaved within the bearing surfaces.

15. The method of claim 14 further comprising positioning means for the bearing surfaces.

16. The method of claim 14 further comprising cooling means for the bearing surfaces using the submersion liquid.

17. The method of claim 14 further comprising cooling means for the bearings by coolant flow through the interior of the stationary shaft.

18. The method of claim 14 further comprising increasing buoyancy of the submerged roller with low density inserts attached to the inside of the roller.

19. An apparatus for supporting a conveyor type roller by means of a stationary shaft extending axially and concentrically through a hollow roller, while configuring said shaft such as to be substantially non-deflecting in order for the bearing segments of the shaft to be loaded while being held fixed at least on the inside while held either fixed or supported on the outside end.

20. The apparatus of claim 19, further comprising a reduced bearing diameter to minimize the possibility of roller stall from high bearing friction torque in non-driven rollers.

21. The apparatus of claim 19, further comprising of sufficient increase in bearing length and contact area to minimize bearing wear rate.

22. The apparatus of claim 19, further comprising keyways cut in the bearing portion of the shaft for the purpose of inserting bearing material inserts, without jeopardizing shaft strength.

23. The apparatus of claim 19, further comprising of increasing the shaft diameter in between each pair of bearings to render the stationary shaft to be generally non-deflecting in between each bearing pair.

24. The apparatus of claim 19, further comprising of adding removable rigid shaft clamps around the shaft ends to keep them rigidly aligned with the aid of proper fastening of said clamps to the roller supports.

25. The apparatus of claim 19, further comprising of a plurality of bearing housings connected to the interior of said roller such that said bearing housings rotate with the roller and therefore their alignment remains assured.

26. The apparatus of claim 19, further comprising of one or more keyways to attach each individual bearing housing to the roller in a manner to allow for differences in thermal expansion between the stationary shaft and the hollow roller.

27. The apparatus of claim 19, further comprising of bearing housings retained within the interior of the roller by means of at least one anchor bolt attached to said roller or by means of at least one connecting rod to tie the two outer bearing housings together.

28. The apparatus of claim 19, further comprising of end plates added to each bearing housing as needed to secure the bearing housing sleeve or inserts.

29. The apparatus of claim 19, further comprising of adding two thrust bearing surfaces, as an integral part of the thickened center portion of the stationary shaft, thereby allowing the two external bearing housings or inserts to absorb both radial and axial thrust loadings.

30. The apparatus of claim 19, further comprising of using tapered bearings to allow the two external bearing housings or inserts to absorb both radial and axial thrust loads.

31. The apparatus of claim 19, further comprising of centering each bearing housing within the roller by means of vane like radial ribs which act as pump impeller vanes so as to motivate the surrounding fluid to flow in the radial direction, through ports within both the hollow roller wall and the rotating bearing housing, for the purpose of bearing cooling and or lubrication.

32. The apparatus of claim 19, further comprising of cooling passages on the inside of the stationary shaft for roller bearing cooling in high temperature operating conditions.

33. The apparatus of claim 19, further comprising of a roller operating submerged inside a bath of molten metal, such as a zinc-pot in a steel-mill galvanizing line.

34. The apparatus of claim 19, further comprising of at least one thin cylindrical tube within the contained volume of the roller having a mass density less than that of the fluid in which the roller is submerged for the purpose of increasing roller buoyancy to reduce bearing load and wear rate and the possibility of roller stoppage.

35. The apparatus of claim 19, further comprising of increasing roller buoyancy by attaching one or more low density sealed cylindrical tubes along the roller inside wall.

36. The apparatus of claim 19, further comprising of an added thin cylindrical sleeve to streamline the gap region in between the rotating roller and the stationary shaft.